

Work Order ID 76252

76252

Page 1

November-08-11 7:47:47 AM

Item ID: D350-748-201

Accept

N900040100

Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Crosstube Installation, High Aft

Start Date: 08/11/2011 Start Qty: 1.00

1

Cust Item ID:

Required Date: 28/11/2011 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: M.L.J Date: 11/11/08

Tooling:

Date:

Run Start ***NR1***

QC: _____ Date: _____

SPC (Y/N): _____

Date:

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr	Revision Nbr
D350-748-241	F

100 ***100*** DOCUMENT CONTROL SP 0.00

DC Memo 0.00
Document Control Photocopy bluefile & type labels per PPPD350-748-201

CHG002

S.2/13/14

M.L.J 12/07/14

110 ***110*** BENDING MACHINE - CROSSTUBES 0.00

CNC Bend 2 Memo 0.00
CNC Alpha 160 Bender Bend tube as per Dwg D350-748-241 using CNC bender program D350A and Folio FT _____

DP

12-1-19

120 QC15- Crosstube Dimensional Check 0.00

120 QC Memo 0.00

Quality Control

S.2/12/13

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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NOTE: Date & initial all entries

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Date:

Tooling:

Date:

Run Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

125

0.00

125

HandFXtube

Memo

0.00

Hand Finishing Crosstubes

Stress relief

Heat treat crosstube as per QSI010 4.3

Temp: 375

Start time: 8h30

Finish time: 8h30

①

SAD 12-01-20

127

QC5- Inspect part completeness to step on W/O

0.00

127

QC

Memo

0.00

Quality Control

8/26/23

1554e PO 14341 LPI as per QSI 0350
ASTM 1417 Level 2

R/1203-2

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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N900040100

Stop ***NS2***

1

*** 1 ***

Run Start *NR1*

Stop *NR2*

Quality Control

MO 12/1/25

12/1/25

12.01.25 (1)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____ Run Start ***NR1***
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150	Outsource process-Cadplate per QSI017 4.1.9.1	0.00							
150									
Outsource3	Memo	0.00							
Outsource process - Cad plate	Issue P/O: <u>15990</u> Stress relief at 375° for 5 hours Magnetic Particle Inspect per ASTM E1444 Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2 Embrittle relief at 375° for 8 hours, Chromate Treat Possibe Supplier: Southwest United Industries Ensure Certificate of Conformity is attached								
160	Receive & Inspect for Damage & Mat'l Certs	0.00							
160									
Packaging	Memo	0.00							
Packaging	Ensure certificate of conformity is attached								
170	QC5- Inspect part completeness to step on W/O	0.00							
170									
QC	Memo	0.00							
Quality Control									

CL 12/01/25

42/3/01
11/3/8

710 →

S. Carlos

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D300-240-201 PAR #: Fault Category: Loose gear/cas tube NCR: Yes No DQA AK Date: 12/03/14
 Resolution: Rework Disposition: Rework QA: N/C Closed: MCU Date: 12/03/14

NCR:		WORK ORDER NON-CONFORMANCE (NCR)							
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector	
			Initial Chief Eng	Action Description Chief Eng	Sign & Date				
12/03/05	#170	tube had indentations found at NDT inspection. Re press.	CP	grind out marks.	MO	S	CP	S	
			12.03.05	Re NDT inspect	12/3/14				12.03.05
			OS/WH	send to Heli. trans for CAD					OS/WH
				touch ups					
				P/O # 16345	CP	S	CP	S	
				Rec'd + attached c/c to do	12/03/05 x1				12/03/05 x1

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 Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____ Run Start ***NR1***
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
180		0.00							
180	SprayPaint					<u>AB</u>	<u>12</u>	<u>3</u>	<u>12</u>
SprayPaint	Memo	0.00							
Spray Painting	1-Prime inside crosstube as per QSI 005 4.2	8:00-8:30							
	2-Paint Outside of Tube as per Dart QSI 005 4.2	12:30-1:15							
190	QC14- Inspect Spray Paint	0.00							
190						<u>W</u>	<u>12</u>	<u>03</u>	<u>13</u> (1)
QC	Memo	0.00							
Quality Control	Then, Wrap in plastic bag to protect from scratches								
200		0.00							
200	Crosstubes					<u>AB</u>	<u>12</u>	<u>3</u>	<u>13</u>
Crosstubes	Memo	0.00							
Crosstubes	1-Install Ground wire Insert, then insert screw and washer								
	2-Install Abrasion strips as per Dwg D350-748-241 & QSI 035.								
	3-Install supports Using Dt8876 as per Dwg D350-748-241, Torque to 60-80 IN-LBS								

W/O:		WORK ORDER CHANGES					
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 Required Date: 28/11/2011 Req'd Qty: 1.00 ***1*** Customer:
 Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____ Run Start ***NR1***
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210	QC5- Inspect part completeness to step on W/O	0.00							
210									
QC	Memo	0.00							
Quality Control									
220	Pick Kit	0.00							
220									
Packaging	Memo	0.00							
Packaging									
230	QC4- 100% Inspect kits for completeness	0.00							
230									
QC	Memo	0.00							
Quality Control									

8/2/3/14

8/2/3/14 *(L)* *(S)*

8/2/3/14

(XL)

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Start Date: 08/11/2011 Start Qty: 1.00

1

Cust Item ID:

Required Date: 28/11/2011 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start

NR1

QC:

Date:

SPC (Y/N):

Date:

Stop

NR2

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

240

0.00

240

Packaging

Packaging

Memo

0.00

Identify and pack for shipping as per PPPD350-748-201

Location:

PPP Rev: B 104 Fk

[Handwritten signature]

250

QC21- Final Inspection - Work Order Release

0.00

250

QC

Memo

0.00

Quality Control

MLC 12/03/14

1203-14

W/O:		WORK ORDER CHANGES					
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Picklist Print

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November-08-11 7:47:51 AM

Work Order ID: 76252

76252

Parent Item: D350-748-201

D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 08/11/2011

Required Date: 28/11/2011

Start Qty: 1.00

Required Qty: 1.00

Comments:

IPP Rev: A New Issue 06-07-05 JLM
 IPP Rev: B Update qty of MS21042L5 06-09-12 KJ
 IPP Rev C Combined manufacturing 08.04.02 EC verified by: DD
 IPP Rev:D 08-06-24 revD as per dwg DD verified by:EC
 IPP Rev: E 08.12.11 Step17 was step 21 KJ Verified by:EC IPP Rev:F
 10.08.04 added QSI010 4.3 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
---------------------------------	------------------------	---------------	-------------	---------------------	------------------	-----------------	--------------------	----------------	-------------	--------------	---------------	----------------	--------

D350-748-241TRN

Manufactured

No

D350-748-241TRN

B73378

Crosstube Turning Detail

**

① JW 12-1-19

Location	Loc Qty	Loc Code
LG	2	
61314	0	
61315	0	
70654	1	
72332	1	
LG003	1	
68840	1	

ALS4-1032-225

Purchased

No

ALS4-1032-225

120671

Insert

**

① AS 12-3-13

Location	Loc Qty	Loc Code
ST281	2418	
108696	498	
110768	62	
118386	858	
118966	1000	

AN960JD10

NAS1149D0363J

Purchased

No

AN960JD10

120388

Washer

**

① AS 12-3-13

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

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November-08-11 7:47:51 AM

Work Order ID: 76252

76252

Parent Item: D350-748-201

D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 08/11/2011

Required Date: 28/11/2011

Start Qty: 1.00

Required Qty: 1.00

D2856-400 Manufactured No 200 f 304.0945 1.181 1.243158
D2856-400 ** 37955, A8 12-3-13
 Abraison Strip

Location	Loc Qty	Loc Code
ST403	0.3149	
68076	0.3149	
ST409	303.7796	
63735	0.6696	
71164	87.11	
73491	216	

1- cut as per dwg D2856

D3502-1

Manufactured No

200 Each

37.0000

2

2

D3502-1

Support

**

A8 12-3-13

Location	Loc Qty	Loc Code
ST063	37	
68951	3	
72129	14	
73419	20	

MS21920-20

Purchased

No

200

Each

72.0000

2

2

MS21920-20

Clamp (per MIL-DTL-8783C)

**

A8 12-3-13

Location	Loc Qty	Loc Code
LG050 120475	72	
116799	10	
118649	12	
119386	50	

November-08-11 7:47:51 AM

Shop Packet Print

Page 2

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

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Parent Item: D350-748-201

D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 08/11/2011

Required Date: 28/11/2011

Start Qty: 1.00

Required Qty: 1.00

MS27039-1-10

Purchased

No

200

Each

304.0000

1

1

MS27039-1-10

Screw

**

M120120 A 12-3-13

Location

Loc Qty

Loc Code

ST291

304

118612

154

119307

100

119531

50

Purchased

No

220

Each

305.0000

8

8

**

AN4-41A

AN4-41A

Bolt

Location

Loc Qty

Loc Code

ST360

305

115108

3

115705

7

116191

20

117619

50

117795

25

118451

50

118838

50

119328

100

Purchased

No

220

Each

5,476.000

16

16

**

AN4-6A

AN4-6A

Bolt

Location

Loc Qty

Loc Code

ST356

476

118838

276

119127

200

ST516

5000

119017

5000

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Shop Packet Print

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Parent Item Name: Crosstube Installation, High Aft

Start Date: 08/11/2011

Required Date: 28/11/2011

Start Qty: 1.00

Required Qty: 1.00

AN5-32A Purchased No

220 Each

195.0000

4

4

**

AN5-32A

Bolt

Location

Loc Qty

Loc Code

ST339

195

118422

20

118628

50

118983

25

119328

100

AN960JD416 NAS1149D0463J Purchased No

220 Each

0.0000

32

32

**

AN960.ID416

Washer

AN960JD516 NAS1149D0563J Purchased No

220 Each

0.0000

8

8

**

AN960.ID516

Washer

D3500-1 Manufactured No

220 Each

16.0000

4

4

**

D3500-1

Saddle

Location

Loc Qty

Loc Code

ST424

4

70695

4

ST427

12

73407

12

D3501-1 Manufactured No

220 Each

237.0000

16

16

**

D3501-1

Bushing

Location

Loc Qty

Loc Code

ST063

237

67757

4

70682

100

73391

133

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Parent Item Name: Crosstube Installation, High Aft

Start Date: 08/11/2011

Required Date: 28/11/2011

Start Qty: 1.00

Required Qty: 1.00

MS21042L4

Purchased

No

220

Each

12,685.00

24

24

**

MS21042I 4

Nut

Location

Loc Qty

Loc Code

ST300

1685

117441

51

117601

532

118451

133

118927

969

ST516

6000

119017

6000

ST518

5000

119075

5000

MS21042L5

Purchased

No

220

Each

2,358.000

4

4

**

MS21042I 5

Nut

Location

Loc Qty

Loc Code

ST300

858

116105

5

116548

43

117611

62

118179

496

118910

252

ST518

1500

119109

1500

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

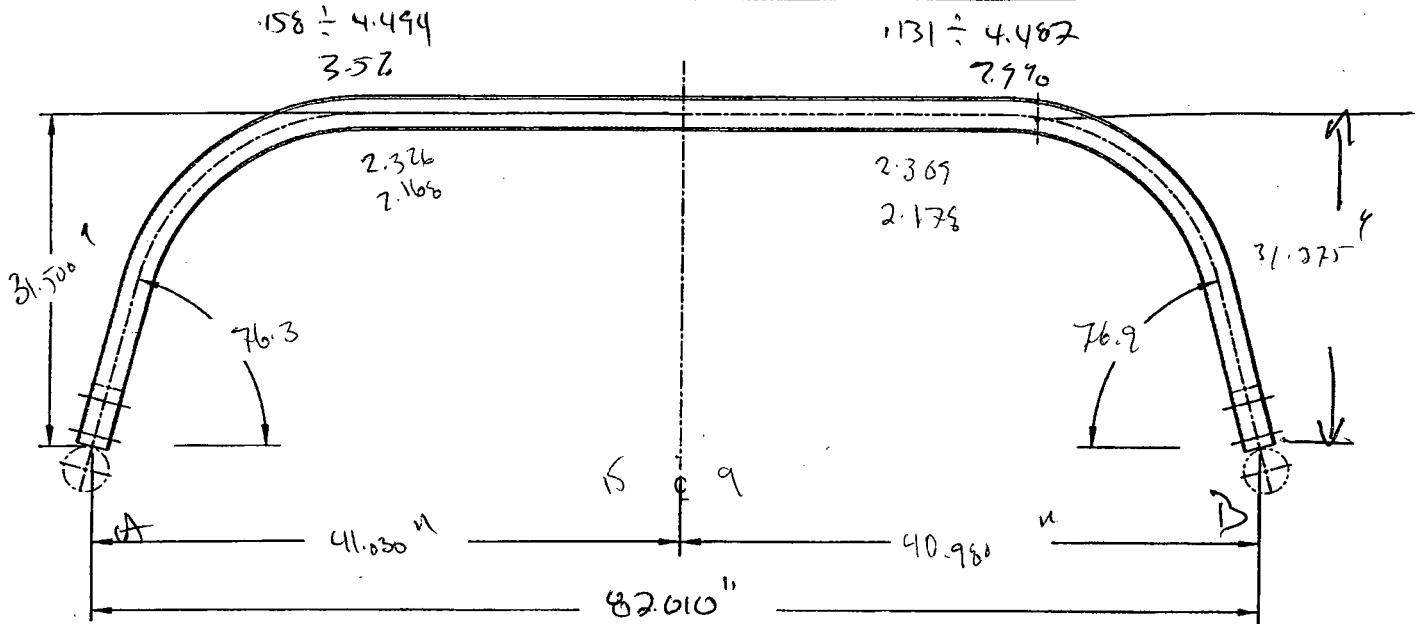
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DART AEROSPACE LTD		Work Order:	76252
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241 Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
Twist ~ 0.010
Side A = 3.52 crush @ 15 passes
Side B = 2.776 crush @ 9 passes
Acceptable @ 12.01.23 RT042

QC15 Inspection	<i>[Signature]</i>
Date	12/01/23

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	<i>[Signature]</i>

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Item	Qty -241	Part Number	Description
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HIAFT)
2	1	D6015-125	CROSSTUBE (OR D6018-125)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6018-125
FINISHED LENGTH = 122.700±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING
LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER
BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO
BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO
CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

SHOP COPY
RETURN TO
ENGINEERING
UNCONTROLLED COPY
SUBJECT TO AMENDMENT

WITHOUT NOTICE
WORK ORDER

NO. 76252 H.C.J

11/11/08

RELEASED
R 2011-07-08
WJP

F	ADD HRC TEST OPTION (B8-1) PER PAR 09-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D1-4)	CP	10.11.23
E	REVISE GENERAL NOTES; UPDATE TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN	9P		
DRAWN	9P		
CHECKED	9P		
MFG. APPR.	9P		
APPROVED	9P		
DE APPR.	9P		
DATE	10.11.23		
DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA DRAWING NO. D350-748-241 TITLE CROSSTUBE (AS 350/355 HIAFT) REV. F SHEET 1 OF 4 SCALE NTS COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.			

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

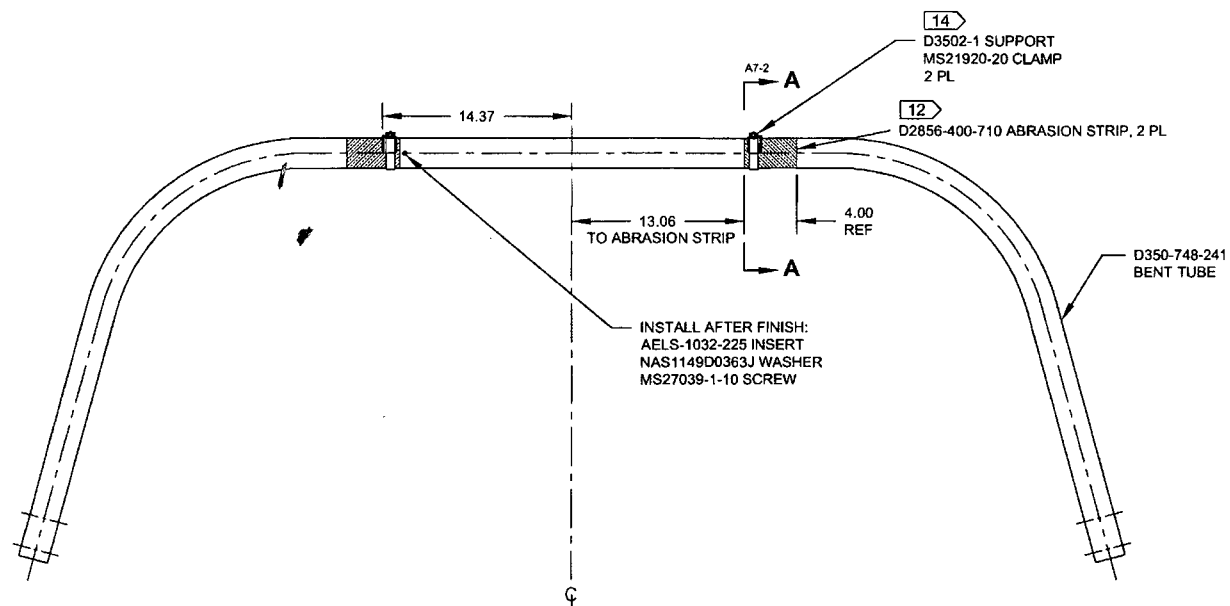
Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

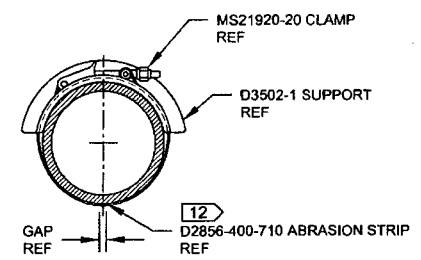
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

76252



**D350-748-241
ASSEMBLY DETAIL**



SECTION A-A D4-2
SCALE 4X

RELEASED
R 2011-02 19
AM

DESIGN	90	DART AEROSPACE LTD	
DRAWN	90	HAWKESBURY, ONTARIO, CANADA	
CHECKED	13	DRAWING NO.	REV. F
MFG. APPR.	13	D350-748-241	SHEET 2 OF 4
APPROVED	13	TITLE	SCALE
DE APPR.	13	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	10.11.23	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

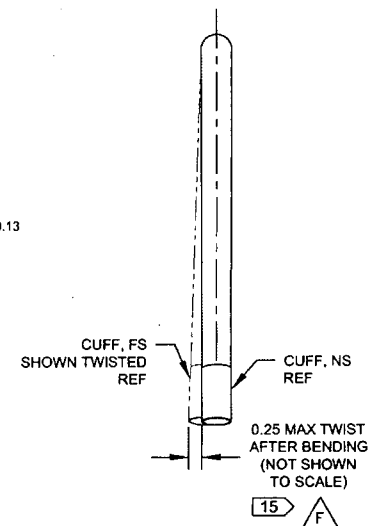
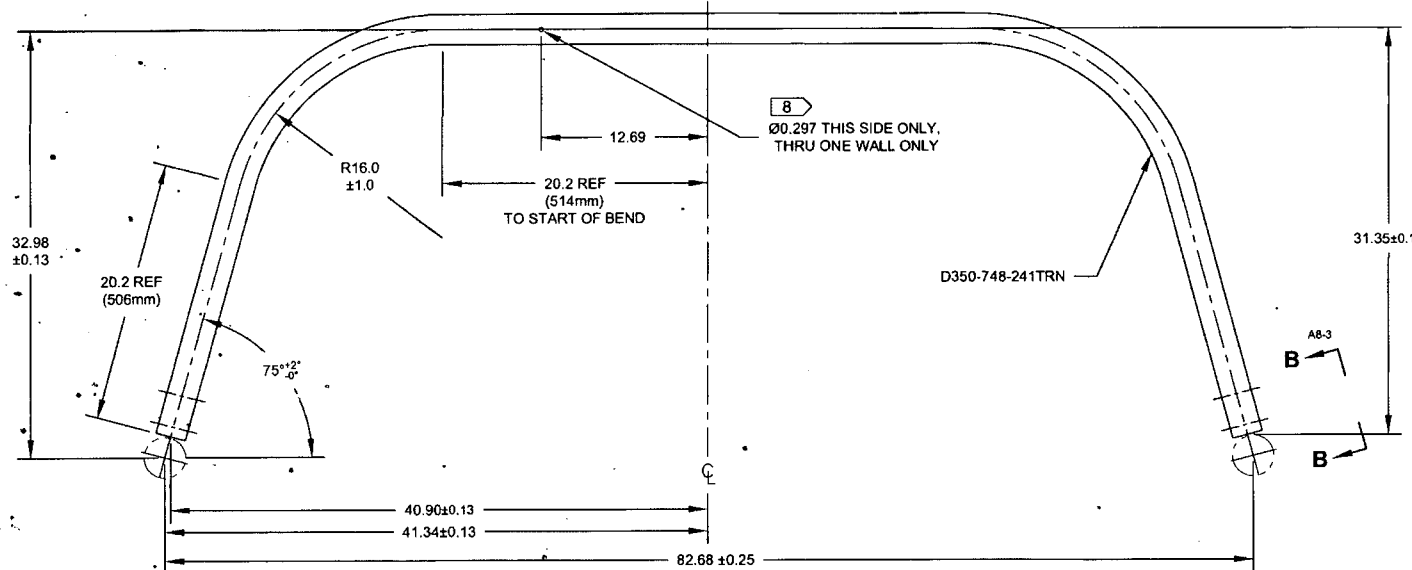
Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

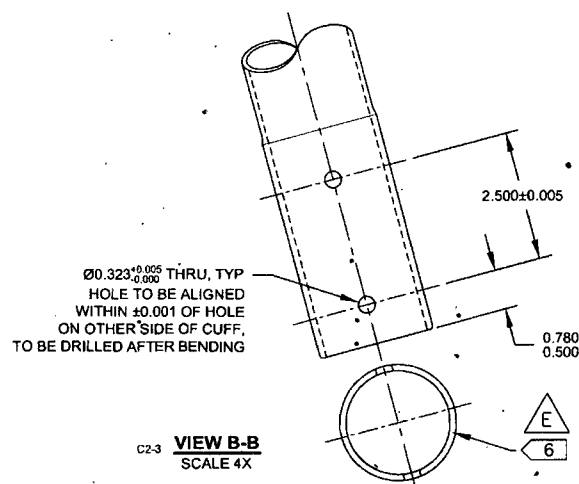
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

7625.2



D350-748-241
BENDING AND DRILLING DETAIL 10



C2-3 **VIEW B-B**
SCALE 4X

RELEASED
2011-01-18

DESIGN	90	DART AEROSPACE LTD	
DRAWN	90	HAWKESBURY, ONTARIO, CANADA	
CHECKED	12	DRAWING NO.	REV. F
MFG. APPR.	12	D350-748-241	SHEET 3 OF 4
APPROVED	12	TITLE	SCALE
DE APPR.	12	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	10.11.23	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD</small>	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

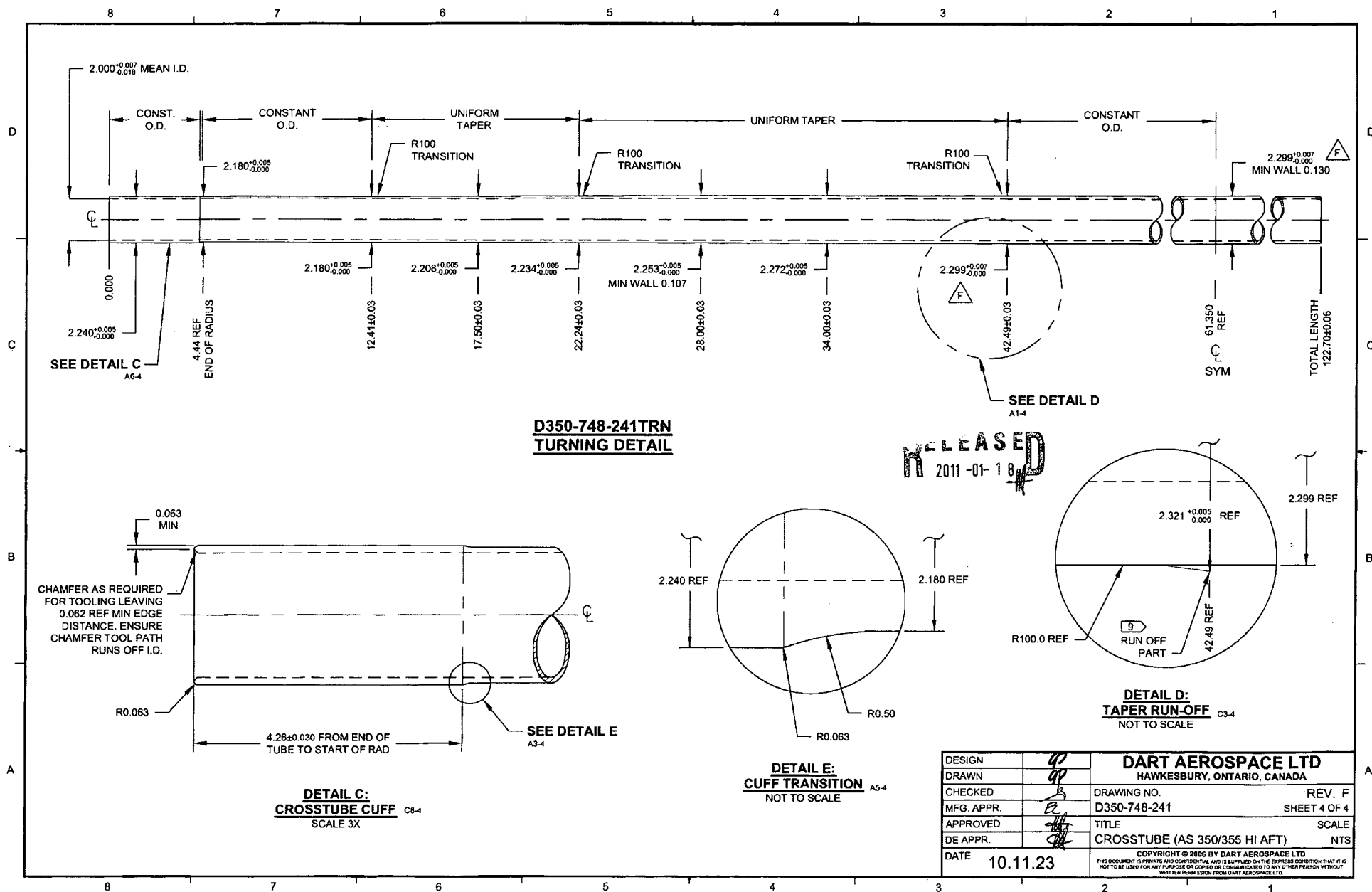
Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

76252



W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

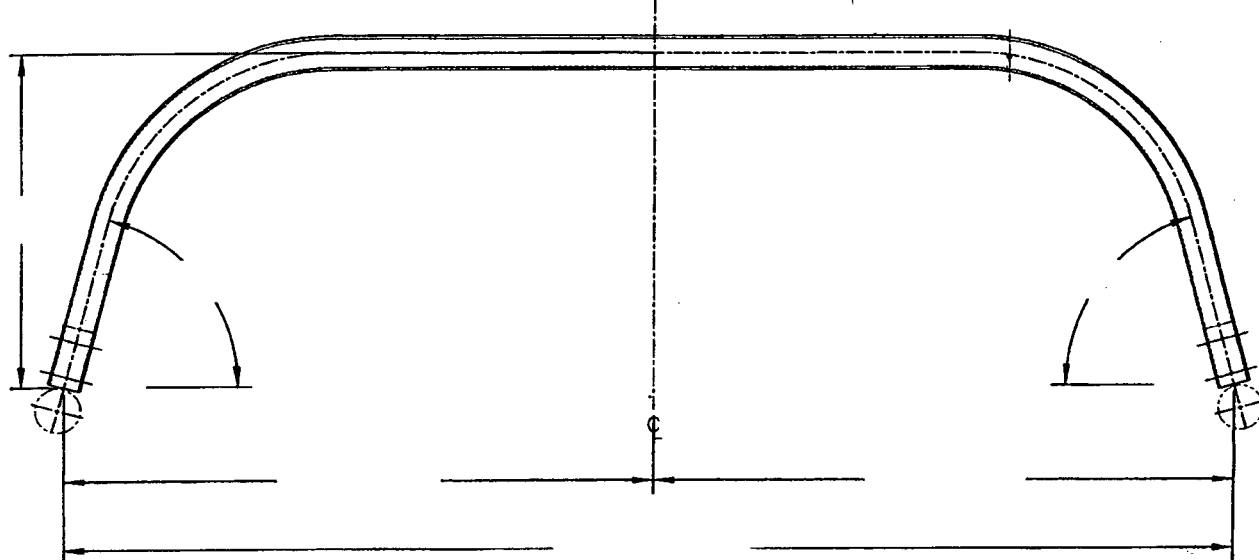
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order: 76525
Description: Crosstube High Aft (AS350/355)		Part Number: D350-748-201
Inspection Dwg: D350-748-241 Rev: E		Page 1 of 1

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06

For stress relief.



Comments
twist = 0.010

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

**CERTIFICATE OF
CONFORMANCE**

**CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1**

DATE: Feb-24-2012

CONSIGNEE TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 111685

INVOICE #: 59166

**CONTRACT OR
PURCHASE ORDER #** PO15990

DESCRIPTION: SKID

QTY 1

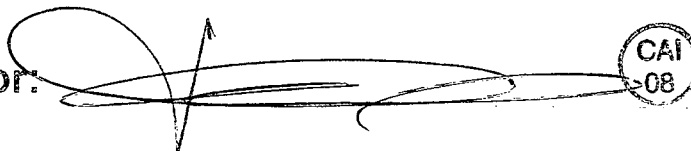
P/N # d350-748-101

S/N # 76252

STRESS RELIEVE BAKE HEAT CHART # 12-132. MPI IAW ASTM-E-1444. CADMIUM PLATE IAW AMS-QQ-P-416C TYPE 2 CLASS 2.
BAKE HEAT CHART # 12-170. MPI IAW ASTM-E-1444.

CERTIFICATE: I certify that the items indicated here on have been inspected and tested and conform to all specifications and requirements detailed on the contract or purchase order.

Approved Inspector:





W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
11/11/01	161	Load tube to 3000 lb for 1 minute REF DIS EMAIL	GP	12-03-01		GP 12-03-01 08/10/01	
11/11/01	162	NDT Tube					

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Chris Provencal

From: David Shepherd <dshepherd@dartaero.com>
Sent: Tuesday, April 27, 2010 3:40 PM
To: 'Mike Petsche'
Cc: 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com
Subject: 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.



LIQUID PENETRANT TEST REPORT

P-14909

AGENT: Dart AgroSpace DATE: 03/02/2012 PAGE: 1 OF 1
ATTENTION: LINDA L. ACUREN JOB NO.: 180-12-C0058
ADDRESS: 1270 ABERDEEN POWO No.: -
Waukesha Bulk O.N. WORK LOCATION: SAME
OBJECT: F.P.I. on CROSS TUBES ACCEPTANCE STD: ASTM 1417/04-03B REV./DATE: 2005
ITEM(S) EXAMINED: (9)

JOB DESCRIPTION: SEE RESULTS PROCEDURE No. LT002 REV./DATE 2008 TECHNIQUE No. LT002 REV./DATE 2008
PART No.: SEE RESULTS MATERIAL: STEEL / ALUMINUM THICKNESS: VARIOUS
SCOPE: A DET FLUORESCENT LIQUID PENETRANT EXAMINATION
ON 100% OF EXTERNAL SURFACE

TEST DETAILS
METHOD: ☒ FLUORESCENT ☐ VISIBLE ☒ WATER WASH ☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED
FAMILY BRAND: MAGNAFLUX BLACK LIGHT S/N: 16459 ☐ OUTPUT > 1000 μ W/cm² ☐ AMBIENT < 2 fc
PENETRANT: ZL67 MINIMUM DWELL TIME: 45 MIN. LIGHTING EQUIP.: ☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT > 100 fc @ SURFACE
PENETRANT REMOVER: H2O MINIMUM DRY TIME: >10 MIN. OTHER: LABINO
DEVELOPER: SKD 52 MINIMUM DWELL TIME: 10 MIN. LIGHT METER S/N: 1098866 CAL DUE DATE: 07/27
DEVELOPER TYPE: ☒ NON AQUEOUS ☐ AQUEOUS ☐ DRY

TEST SURFACE
SURFACE CONDITION: ☐ AS GROUND ☐ AS WELDED ☒ MACHINED ☐ SHOT BLASTED ☒ CLEAN BARE METAL
SURFACE TEMPERATURE: ☐ < -4°C/20°F ☐ -4°C/20°F TO 10°C/50°F ☒ 10°C/50°F TO 52°C/125°F ☐ > 52°C/125°F

RESULTS- (☐ METRIC ☐ IMPERIAL)

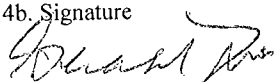

1 - W.O.	73924	X	REBLAND 1 TIME.
1 - W.O.	76254	✓	REBLAND 1 TIME.
1 - W.O.	75662	✓	REBLAND 1 TIME.
1 - W.O.	75664	✓	
1 - W.O.	79934	✓	
1 - W.O.	79933	✓	
1 - W.O.	79019	✓	REBLAND 1 TIME.
1 - W.O.	79018	✓	
1 - W.O.	76254	✓	

5/7/03/15

Scope of Services
An agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacturing, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care
In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES
CLIENT REPRESENTATIVE: Anthony Sheldon PRINT: ASheldon SIGNATURE: [Signature] DTR #: EG8914
TECHNICIAN (SIGNATURE): [Signature] REPORT REVIEWED BY: [Signature]
NAME (PRINT): Mike Johnson 1st TECHNICIAN: [Signature] 2nd TECHNICIAN: [Signature]
CGSB LEVEL: 2 SNT LEVEL: 2 CGSB LEVEL: 2 SNT LEVEL: 2
CGSB REG. NO.: 6606 CGSB REG. NO.: 6606

1. Approving Civil Aviation Authority/Country Transport Canada		2. AUTHORIZED RELEASE CERTIFICATE FORM ONE			3. Form tracking No. HTV-3056 Page 1 of 1	
4. Approved organization name and address HELITRADES INC. 18 Terry Fox Drive, Vankleek Hill, Ontario, K0B 1R0, Canada					5. Work order/contract/invoice H-18164	
6. Item	7. Description	8. Part No.	9. Qty	10. Serial/Batch No.	11. Status/work	
1	CROSS TUBE	D350-748-201	2	N.S.N.	REPAIRED	
12. Remarks BRUSH CADMIUM PLATING APPLIED TO AFFECTED AREA.						
DOCUMENTATION FOR ALL WORK PERFORMED IS AVAILABLE ON FILE UNDER HELITRADES W/O SPECIFIED IN BLOCK # 5.						
13a. Certifies that the items identified above were manufactured in conformity to:			14a.			
<input type="checkbox"/> Approved design data and are in condition for safe operation. <input type="checkbox"/> Non approved design data specified in block 12.			<input checked="" type="checkbox"/> CAR 571.10 Maintenance Release. <input type="checkbox"/> Other regulations specified in block 12. Certifies that, except where otherwise specified in block 12, the work identified in block 11 and described in block 12 was performed in accordance with the Canadian Aviation Regulations.			
13b. Signature		13c. Approved Organization Number		14b. Signature		14c. Approved Organization Number
				 		AMO 3/86
13d. Name		13e. Date (dd/mm/yyyy)		14d. Name		14e. Date (dd/mm/yyyy)
				GERALD TOM		07-Mar-12
<p>"This certificate does not constitute authority to install. Installers working in accordance with the national regulations of a country other than that specified in block 1 must ensure that their regulations recognize certifications from the country specified. Statements in blocks 13a or 14a do not constitute installation certification. In all cases, the technical record for the aircraft must contain an installation certification issued in accordance with the applicable national regulations before the aircraft may be flown."</p>						

(Previously form 24-0078)

HELITRADES INC.

P.O. Box 162, 18 Terry Fox Drive
Vankleek Hill, Ontario
K0B 1R0, Canada
TEL (613) 678-3027 FAX(613) 678-2776
Email: helitrad@hawk.igs.net
GST# R102320439

STRIP REPORT:**H18164****STRIP REPORT DATE:**

07-Mar-2012

CUSTOMER P.O.

16345

CUSTOMER I.D.:

DART AEROSPACE

DATE ITEM RECEIVED:

05-Mar-2012

SOLD TO: DART AEROSPACE
1270 ABERDEEN STREET**SHIP TO:**HAWKESBURY K6A 1K7
LINDA/MELANIE**Part Number:** D350-748-201
Description: CROSSTUBE (2ea)
Component ID: 206-13**Serial Number:** UNKNOWN**Removed From:** UNKNOWN**GENERAL CONDITIONS AS RECEIVED:**
GOOD.**UNIT RECEIVED FOR:** OVERHAUL _____ REPAIR X TEST _____ WARRANTY _____ INSP _____**WARRANTY ACCEPTED:** YES _____ NO _____ N/A X**REPORTED FAILURE:** TO BRUSH CAD REPAIRED AREAS.**WAS REPORTED FAILURE CONFIRMED:** YES X NO _____**REMARKS:**

CROSS TUBE REPAIRED AREAS BRUSH CADMIUM PLATED.

DATE March 07, 2012INSPECTOR Gerald Tom

8/17/12/08

REFERENCE ONLY

DART AEROSPACE LTD.

IIN-D350-748

Page 6 of 10

REFERENCE ONLY

5.0 PARTS LIST

Qty -101	Qty -201	Part Number	Description
X		D350-748-101	CROSSTUBE INSTALLATION, AS 350/355 HIGH FWD
	X	D350-748-201	CROSSTUBE INSTALLATION, AS 350/355 HIGH AFT
1		D350-748-141	CROSSTUBE ASSEMBLY, AS 350/355 HIGH FWD
	1	D350-748-241	CROSSTUBE ASSEMBLY, AS 350/355 HIGH AFT
*2	*2	D3502-1	SUPPORT
*2	*2	D2856-400-710	ABRASION STRIP
*1	*1	AELS-1032-225	INSERT
*2	*2	MS21920-20	CLAMP
*1	*1	MS27039-1-10	SCREW
*1	*1	AN960JD10	WASHER
4	4	D3500-1	SADDLE
16	16	D3501-1	BUSHING
16	16	AN4-6A	BOLT
8	8	AN4-41A	BOLT
4	4	AN5-32A	BOLT
32	32	AN960JD416	WASHER
8	8	AN960JD516	WASHER
24	24	MS21042L4	NUT (OR MS21042-4)
4	4	MS21042L5	NUT (OR MS21042-5)

* REFERENCE ONLY. PARTS ARE INCLUDED IN D350-748-141/241 ASSEMBLIES ABOVE

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Revision: **B**

Date: 07.06.15

Work Order ID 76252

November-08-11 7:47:47 AM

76252

Item ID: D350-748-201

Accept

N900040100

Setup Start

NS1

Revision ID:

Stop

NS2

Item Name: Crosstube Installation, High Aft

Start Date: 08/11/2011 Start Qty: 1.00

1

Cust Item ID:

Required Date: 28/11/2011 Req'd Qty: 1.00

1

Customer:

Reference:

Run Start

NR1

Approvals:

Process Plan: *MLC*

Date: *11/11/11*

Tooling:

Date:

Stop

NR2

QC:

Date:

SPC (Y/N):

Date:

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

Draw Nbr

Revision Nbr

D350-748-241

F

100

0.00

100

DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile & type labels per PPPD350-748-201 CHG002

110

0.00

110

BENDING MACHINE - CROSSTUBES

CNC Bend 2

Memo

0.00

CNC Alpha 160 Bender

Bend tube as per Dwg D350-748-241 using CNC bender program D350A and Folio FT

120

0.00

120

QC15- Crosstube Dimensional Check

QC

Memo

0.00

Quality Control

MLC 12/03/11

DP

12-1-19

5126123